

THE CANNON

October 23, 1979

University of Toronto Engineering Society

Volume II Number 4

New Wave of Women Engineers

Women engineers get higher starting pay (but fewer opportunities they say) than men

A new wave of engineers has begun surging into the profession — women. The rising enrollments of the past decade are beginning to show up in greater percentages of female graduates entering the engineers' job market in the U.S.

And the women, heavily recruited, are being offered higher starting salaries than men. They are entering the field with ambition and high aspirations.

But as the women see it, they still face a tougher struggle for career advancement than male engineers do.

"We're seeing a new wave of available women engineers," says Paula Loring, former president of the Society of Women Engineers and a member of the technical staff of the Mitre Corp. "But the woman engineer with the same ability and education as a male engineer does not have the same chance for career advancement as the man."

A decade ago, women faced obstacles simply finding engineering jobs, but "job entry is no problem right now," agrees Thelma Estrin, IEEE's Division VI Director and head of data processing at the Brain Research Institute of the University of California, Los Angeles.

"Women are being moved into engineering jobs. The main problem is promotion into project and corporate management."

In the opinion of both Dr. Estrin and Mrs. Loring, two reasons that job entry is no longer a problem for women engineers are:

1. The overall shortage of engineers has forced industry to hire more of the growing number of women engineers graduating every year.

2. Companies are scrambling to fill affirmative-action objectives they haven't met yet.

According to a survey of 1978 engineering graduates conducted by the Engineering Manpower Commission of the Engineers Joint Council, the average monthly starting salary of women graduates was \$1431, while that of men was \$1395, while that of men was \$1395. The previous year's figures were \$1315 for women and \$1282 for men.

Though in 1978 only 2.8 per cent of all U.S. engineers were women, that fraction has increased 150 per cent since 1976 and 245 per cent since 1970. Since the total of U.S. engineers exceeds one million, the increase means about 10,000 more women engineers in the U.S. in 1978 than there were in 1976 and about 20,000 more than in 1970.

The trends in degrees and enrollments of women in engineering indicate that their percentage is likely to continue to grow in the near future. In June 1978, 7.1 per cent of bachelor degrees in engineering in the U.S. went to women — a huge increase from the 1.8 per cent in 1974 (Table II). Influencing the next few graduating classes is the exponentially increasing enrollment of women in engineering. It hit 11 per cent in September 1978, up from 1.3 per cent in 1969 and 6.9 per cent in 1975.

Interviews with women engineers indicate that the

causes of the career-advancement problem could be discrimination, inexperience on the part of the women or simply lack of numbers and visibility.

Some resistance to promoting women spring from men now in management. "There are still problems of discrimination by some middle-aged and older men," says Violet Hass, professor of electrical engineering at Purdue University. "The men in those generations haven't had the experience of working side by side with women."

Dr. Estrin says that it takes a generation to undo conditioning.

Besides discrimination, some women might be held back by their own naivete and inexperience.

"I don't see many women coming along who are aggressive enough or have a clear picture of what it takes in personal time and dedication to become a manager," says Carolyn Morris, product

continued page 2



A Man For All Cracks

In the late spring of 1978, Professor I.W. Smith, director of the Cockburn Centre for Engineering Design and professor of Mechanical Engineering, retired after providing many years of able leadership to the Cockburn Centre. His successor who joined the staff last September is Professor David Hoepfner, who is cross appointed as director of the Cockburn Centre and as professor of Mechanical Engineering.

Professor Hoepfner received his undergraduate training at Marquette University and went on to earn his masters degree and his doctorate from the University of Wisconsin. He has an extensive practical background in solid mechanics design, primarily in the American aircraft industry.

In ascending order of specialization his technical interests are solid mechanics, various forms of fatigue and other forms of material failure, and ultimately designing for maximum structural integrity. To the neophyte engineer this sounds ominous and it is. According to Dr. Hoepfner, very few industries expend the time

and effort to design their products with fracture mechanics (why and how materials break) in mind. This he hopes will change with time as more people realize the magnitude of the waste that occurs due to things breaking. Dr. Hoepfner is urging on this realization by educating all of his students in the ways of fracture mechanics.

Some specific research projects under Dr. Hoepfner's supervision include special studies of fretting fatigue and corrosion fatigue, attempts at micro-mechanical modelling of fatigue, and studies of elevated fatigue crack growth. To sum up all of these efforts in one phrase is possible under the heading "crack studies."

The National Science Council - National Research Council also recently purchased a \$30,000 scanning electron microscope for the Mechanical Department so that Dr. Hoepfner could direct research into the fatigue problems of cast irons. Presently, fourth year student Cameron Searles is in the process of mounting a fatigue machine, designed and built by Dr. Hoepfner, on the

electron microscope. Upon completion of the project, which Searles is doing as his CED 401Y design project, it will hopefully be possible to watch fatigue occurring at the microscopic level.

As justification for all of the human energy being funnelled into this special field, Dr. Hoepfner points to the recent news headlines involving an Air Canada DC-9 which lost its tail cone shortly after take off from Logan Airport in Boston and a DC-10 which lost an engine after take off from O'Hare Airport in Chicago, killing all those aboard. These and many less publicized "accidents" which cost many lives and billions of dollars collectively all occur because of insufficient knowledge or incorrect application of design techniques which account for fatigue and fracture mechanics generally.

Another recent accomplishment of Dr. Hoepfner's is the winning of a contract to teach engineers from the United States Federal Aviation Administration a special course on fatigue and fracture mechanics

continued page 2

In this issue:



Women in Electrical?—page 2

Public Service—page 3

Committee—page 4

Engineers Win—page 4

A Man For All Cracks

cont'd from page 1

as applied to aircraft. The real coup de grace in this case is that of all the Universities in North America, only UofT's Mechanical Engineering Department submitted a bid to teach the course. The course itself went well and the FAA wants to send up another group of engineers to take the course and Transport Canada is also interested in arranging a course for their engineers.

For the future, Dr. Hoepfner sees nothing but growth in this field. At the present time only aircraft and space craft fully utilize fail safe design, fatigue design, crack stoppers, and other elaborate fracture mechanics techniques. Dr. Hoepfner predicts that the automobile will be next and other applications will follow. As this happens, the Mechanical Engineering Department submitted a bid to teach the course. The course itself went well and the FAA wants to send up another group of engineers to take the course and Transport Canada is also interested in arranging a course for their engineers.

For the future, Dr. Hoepfner sees nothing but growth in this field. At the present time only aircraft and space craft fully utilize fail safe design, fatigue design, crack stoppers, and other elaborate fracture mechanics techniques. Dr. Hoepfner predicts that the automobile will be next and other applications will follow. As this happens, the Mechanical Engineering department at the UofT should become an important centre for fatigue studies, that is if Dr. Hoepfner can in any way influence that outcome.

By HUBERT VOGT

Fourth Year Committee

The committee is for ALL fourth-year's and is made up of a chairman, the Club-Chairmen and any interested fourth year of third year. The committee is responsible for the Grad Photos, The Kipling ritual, and the Grad Ball. If you think you have anything useful to add or have some bright ideas or just like helping out then:

a. come to the meetings or,

a. come to the meetings or,
b. leave a message in my mail box or,
c. get on your Club-Chairman's back.

This year Grad Photos were taken by Brian Toll during the second and third weeks of September (September 10 - September 21). If you did not get yours during this time do not expect to show up in the year-book (870), or your class composite. (Unless you see me soon).

Grad Ball will be held on March 15, 1980, a Saturday. Plan on being there (i.e. start saving up those pennies now). This grand event only occurs once in your lifetime, so you bloody well better show up.

Arun Channan
Chairman
Fourth Year



Electrical engineering lags in enrollment of women

The statistics show that the new wave of women enrolling in college engineering programs is not choosing electrical engineering as much as other disciplines (Table I and II). Only 6.5 per cent of all U.S. electrical engineering students in September 1978 were women, and even fewer (3.4 per cent) of B.S. degrees in EE went to women are enrolling in computer science departments which in many schools were formerly programs within EE departments. The computer science enrollments, however, would not significantly increase the percentage of women in electrical engineering if the two disciplines were combined.

Carolyn Morris, chairwoman of IEEE's Committee on the Professional Opportunities for Women and product marketing manager for Hewlett-Packard, ventures a guess as to why electrical engineering might not be attracting its share of the new wave of women.

"Electrical engineering could

be perceived as more esoteric than the other disciplines," Ms. Morris said. "Other disciplines have branched into areas with biomedical, ecological, and environmental applications, but, except for computers, EE has not branched into areas that appear to have societal applications."

Thelma Estrin, IEEE's Division VI Director and head of data processing for the Brain Research Lab at the University of California, Los Angeles, noted a very practical reason why women might avoid electrical engineering.

"It could be the obsolescence factor," Dr. Estrin said. "The electronics field is changing so fast that maybe women considering it as a career fear that if they have to leave the profession temporarily to raise a family, they'll be left behind." Another reason simply could be a lack of information. "Maybe women just don't know about it," Dr. Estrin noted.

THE INSTITUTE AUGUST 1979

MEMORANDUM

PROFESSIONAL DEVELOPMENT COMMITTEE

Applications are now being accepted for the selection of delegates to attend two important, upcoming conferences. Any member of the Engineering Society may apply, bearing in mind that delegates may have to assume some of the transportation costs and will definitely have to contribute to the input of the delegation. Please direct applications to the Prof. Dev. mailbox in the Stores. Applications should be submitted on a single sheet of foolscap with vital statistics and a reason why the executive should choose you. Academic standing may be included if desired.

1) APEO-UES University of Windsor, Nov. 9-11, 1979. 4 delegates.

The theme of this year's Association of Professional Engineers of Ontario—Undergraduate Engineering Students is "The Training of the

Engineer." Delegates will be accommodated at a hotel and UofW will take care of meals and social events as well. Various guest speakers, debates and a film are slated.

2) The Twelfth Congress of Canadian Engineering Students 2-4 delegates University of Alberta (Edmonton) Jan. 2-6, 1980.

The Theme of this year's conference is "The Engineer and the Corporate System." The format will be similar to the Windsor conference. There will be in addition, be tours of local industrial interests, a panel discussion, opening wine & cheese, closing banquet and dance and a presentation of student papers (one per school) on the main theme.

Regards,
Stephen Landsberg,
Professional Development,
Chairman.

Women engineers

cont'd from page 1

marketing manager in Hewlett-Packard's General Systems Div. and head of IEEE's Committee on Professional Opportunities for Women. "They just don't have what it takes in energy, stamina, and expertise beyond an engineering degree."

"Women just coming into the profession are short on business techniques and politics. Even those women who are aggressive enough tend not to know how to work through the system. When I see them, I try to help them along."

Dr. Estrin notes that women engineers do not have many role models in management. "Men usually have mentors who guide them up the ladder," she says. "It's the 'old boy' network. Women aren't included in it."

However, women engineers at three large companies — the Aerospace Corp., Arco, and the Bechtel Power Corp. — have formed groups to help improve women engineer's organizational skills, provide information about job openings, and make the companies aware of women who are qualified for promotion.

With only 2.8 per cent of U.S. engineers women, the female engineers feel that visibility and sheer lack of numbers is likely to influence the perception of women as engineers and the attitudes of their coworkers and managers towards them.

"Visibility will be a factor for many years to come," says Martha Sloan, professor of electrical engineering at Michigan Technological University.

How much impact will the growing numbers of women entering the profession have in the near future?

Michelin Bouchard, president of Ordre des Ingenieurs du Quebec and an engineer at Hydro-Quebec, sums it up this way: "We need to increase the number of women engineers to change people's attitudes. As long as the per centage of women is low, the image of engineering will be unfeminine."

"In five years perhaps 4.5 per cent of engineers will be women," predicts Mrs. Loring.

Dr. Estrin believes that by the year 2000, 25 per cent of the workforce and 40 per cent of the engineering graduates will be women.

Both Mrs. Loring and Dr. Estrin contend that 50 per cent would be the ideal equilibrium of women and men in the engineering profession. However, Mrs. Loring sees 40 per cent as the leveling-off point.

"Fifty per cent is ideal," she says, "but to get there, all of the women in engineering would have to adjust to the pressure of work, family, spouse's job, etc. Some of them will drop out at least temporarily."

Tom Lombardo

Reprinted from The Institute Aug. 1979

Engineer yourself out of a rut and into an exciting career

As a Maritime Engineering Officer in the Canadian Forces you'll have many chances to apply the skills you learned in university. You'll be expected to combine that know-how with a basic ability to relate to people. You'll develop your leadership. You'll be exposed to new learning situations and day-to-day experience that needs your intelligence-in planning, managing, and decision-making.

WE ARE OFFERING

- a commission as a Maritime Engineering Officer in the Canadian Armed Forces.
- competitive salary
- relocation allowances and a benefit package second to none
- an opportunity for steady career advancement and professional growth

For further information attend a presentation by the MILITARY MARITIME ENGINEERING BRIEFING TEAM IN ROOM 120 The Galbraith Building 5 November 1979, 12:00 to 2:00 PM or contact:

Major Don Marion
Canadian Forces
Recruiting Centre
4900 Yonge Street
Willowdale, M2N 6A4
Call Collect:
416-224-4006

Major Don Williamson
Canadian Forces
Recruiting Centre
150 Main Street
Hamilton, L8P 1H8
Call Collect:
416-523-2751

GET INVOLVED WITH THE CANADIAN FORCES.

Public Service In Canada

The Public Service of Canada has a continuing requirement for men and women with science and engineering qualifications in various disciplines and specialization. Included are opportunities for both recent graduates and more experienced persons.

In the development of such a large and diversified country as Canada, there are excellent opportunities for a professional career in the Public Service. With HQ in Ottawa and Regional Offices across Canada, the Public Service Commission is responsible for the recruitment and selection of a wide range of scientists and engineers to meet the rising demand in many areas of specialization including the protection of our environment, energy development and conservation, and the technological aspects involved in developing Northern Canada. Salaries depending on education and experience are comparable with salaries of the professionals in the science and engineering field in Canada. There is also a wide range of additional benefits. Advancement is based on merit, with assignments of increasing responsibility. Rotation within and transfer between Departments and locations is arranged to assist in career development. Membership and participation in professional and technical associations is encouraged, including attendance at national and international conferences, conventions and seminars. A wide range of formal training courses are available with the Public Service of Canada and financial assistance may be given for post-graduate and other courses at Canadian or other universities.

Environmental Protection

There are increasing employment opportunities in the field of environmental protection including air and water pollution abatement and control, ecological and eco-systems, solid waste management, noise abatement and control, sanitary and Public Health Engineering, management of water and land resources.

Essential aspects of environmental protection for which the Public Service of Canada is recruiting engineering and science personnel:

- preserve public health by conserving the human resources of Canada;
- design and implement studies to control pollution (air, water, noise, lighting, exposure to radiation);
- air quality management and assessment;
- establish closer liaison with agencies at federal and provincial levels involved in pollution control;
- foster co-operation and understanding with industry, research institutions and the public;
- establish safety standards and pollution prevention measures for off-shore drilling (oil and gas);
- enforce legislation to prevent damage to northern Canada landscapes and eco-systems;
- national contingency plans for oil and toxic material spills, and pesticide research in the Great Lakes;
- develop water quality control, water pollution abatement and solid waste disposal policies.

Energy Development and Conservation

An area of much public interest and concern in Canada and elsewhere is energy development and conservation. Lately we frequently hear and

read about "Struggle for fuel" and "shortage of fuel for cars and home heating" - so talk about an energy crisis is more than hyperbole. In recent years the energy field has received increased research and development study by the Public Service of Canada. This has created a need for an increase in science and engineering staffs.

Most Canadians cannot yet get excited about the problem of an energy crisis, but we have all recently become aware of fuel price increases and government warnings of the need for conservation and possible fuel rationing this coming winter. In recent years we in Canada have been aware of the growing energy shortage in the U.S. - cutbacks in voltage due to overload generators, requests by public utilities to turn off appliances and lights not essential, schools closed due to lack of heat and service stations closed by gasoline shortage.

The demand for a clean environment will contribute to problems related to an energy shortage. Domestic fuels with high sulphur content must be restricted to meet the requirements of the Canada Clean Air Act and demands for other environmental safeguards slow down the construction of pipelines and nuclear power plants. It has been stated: "environmental goals and energy demands are on a collision course."

Canada's energy reserves are vast - but not inexhaustible. Their management is a duty and a trust imposed by coming generations on the present one. That duty and trust imposed by coming generations on the present one. That duty and trust devolves upon the men and women who staff ap-

plicable departments in the Public Service of Canada. Their responsibility is to watch, analyze, and predict trends of energy development, to further the technology of the energy industries while protecting our environment and to recommend to those who guide the nations destiny measures that will enable Canadians to use their resources with maximum benefit to all. Employment opportunities continue in the Public Service of Canada for energy development and regulation including: the economic development and effective use of uranium resources; the role of nuclear energy in Canada; and the development of oil, gas, coal and electrical energy resources.

Canada's greatest source of energy is the oil and gas industry. This is a resource industry which is constantly looking for skilled graduates and willing to pay for those who measure up to the particular skills required in the field of Petroleum.

A current and exciting area of particular interest and concern by the Public Service of Canada for oil, gas and mineral resources is OFFSHORE from Canada's east and west coasts, the Hudson Bay and Hudson Strait and the Arctic. Responsibilities include the operation and conservation practices of oil companies carrying out exploration and development activities for oil, gas and other minerals offshore. More specific duties involve formulating operational and conservation policies, drafting regulations, designing standards and procedures, implementing and enforcing federal requirements, coordinating and consulting with agencies of government and industry in Canada and elsewhere. A quickly accelerating offshore activity has increased the demand for offshore petroleum engineers to serve as conservation engineers under the Oil and Gas Production and Conservation Act. There is also an increasing demand for scientists, economists and other professionals for employment dealing with offshore ex-

ploration and development.

Developing Canada's North

The chance to participate in the development of our northern frontiers has always been irresistible to an increasing number of Canadians. Few have any desire to live and work in a more hospitable climate and those who leave the area usually return having discovered a rather personal endeavor to life and work in the vast region of Canada's northland. Because of the vastness of these regions, many companies have already formed consortiums to undertake exploration and development. Further efforts are enhanced by the recent oil discoveries at Prudhoe Bay and Atkinson Point, and the natural gas discoveries on Melville and other Arctic Islands. These discoveries have brought an influx of men, women and materials into the north. For some of the natives, this results in wealth and comfort previously unknown to those who have lived for centuries in harmony with nature in the north.

Many opportunities for engineers and scientists will centre in Public Service of Canada circles as the north glows in importance and the need for federal involvement must remain strong. There is a current and future requirement for professional engineering and science personnel who will be directly concerned with the exploration and development of the untapped resources in the vast regions of Northern Canada, including the Arctic. More specific responsibilities include implementing various Acts and Regulations pertaining to mining, oil and gas, water, forests and land use operations. This is done under authority of the Northern Land Waters Act, Dominion Water Power Act, Oil and Gas Production and Conservation Act, Arctic Waters Pollution Prevention Act, Territorial Lands Act. The aim of legislation under these and other Acts is to regulate, manage and encourage the enhance development of natural resources.

Thanks to F.E. Barr Class of '52



Labatt's Blue smiles along with you

**A student Editor named Sue,
While studying on-campus brew,
Says the trend is now clear
To a beer without peer,
Labatt's Blue is now 'in'
with 'Who's who'!**

the CANNON

978-5377

Editor:
Mr. Alan Suran

Assistant Editor:
Miss Dana Stonkus

With special thanks to:
Eric Hartwell
Susan Samuels
H. Vogt
Bob Mault?

The CANNON is a publication of the University of Toronto Engineering Society. It is published to announce EngSoc events, discuss Faculty and educational matters, present technical and University news and to be an open forum for the opinions and interests of members of the Faculty. All those who would like to help with the CANNON are most welcome.

Submissions to the CANNON are also welcomed. They should be typed. The deadline for submission of articles for the upcoming Tuesday's CANNON is Thursday at five. EngSoc announcements must be in by noon Monday. The editor reserves the right to edit letters.

The CANNON office is located in the EngSoc offices: Third Floor, Old Metron Library, 20 St. George St., University of Toronto, M5S 2E4.

TINY TOIKE PAGE

ELEC. SMOKER

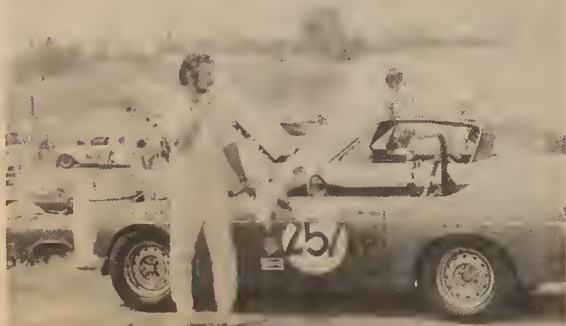
Thursday October 25 at 5:00 pm in ML 205.
Cheap beer. Terry and Jim promise entertainment.

Car Rally

November 5. For more details see Elaine Campbell at the Stores.

Engineering Yearbook: Skule 8T0

Whether or not you've worked on a yearbook before, get involved with this year's Book of Skule by coming to the organizational meeting Thursday October 25 at 12:00 in the Stores. We need people who can take photographs, type or just draw a straight line (ruler provided). If you can't make the meeting, leave your name and number in the yearbook mailbox and we'll get in touch.



Eng. Sci. Dinner

Thursday November 22 at 7:00 pm at Fantasy Farm. Tickets available at the Eng. Sci. Office.

1980 GRADS! UNDERGRADS!

The following companies/institutions will be conducting briefing sessions on-campus in up-coming weeks. This is your chance to investigate opportunities and to speak personally with knowledgeable representatives.

Company/Institution	Target Group	Date/Time	Location
Trane Company Engineering Sales	All engineers	Monday October 29 12-1 pm	Mechanical Bldg. Room 254
College Pro Painters	All disciplines	Monday October 29 2-4 pm.	Sidney Smith Hall Room 1072
Canadian Forces— Recruiting Centre	All disciplines	Monday November 5 12-2 pm.	Galbraith Bldg. Room 120

Engineers Win Track and Field

Forty inspired engineers appeared Wed. Oct. 3rd at Varsity Stadium to prove that one does not have to be a jock to be an athlete. Despite the wet weather the Skulemen amassed 191 pts., more than tripling the impotent 57 pt. total achieved by the ineffective 2nd place jocks. Congratulations to all Skulemen who participated.

Good work to M. Janischewskyj who came in 1st in the 200 m. with a time of 24.81 sec. and T. Piper with a 1st in the 5000 m. in 16 min. 17 sec.

STANDINGS

1st Place Engineering	191 pt.
2nd Place PHE	57
3rd Place Forestry	40
4th Place Grads	30
5th Place Trinity	29
6th Place New College	28



Dana and Sue valiantly try to suppress their sex appeal long enough to demonstrate that people really do read the Cannon.

CCED Moves Into New Offices

The Cockburn Centre for Engineering Design has moved into its new offices located on the first floor of the old wing of the Mechanical Building, across the hall from the heat engines lab. The facilities include an office for the director, Dr. D. Hoepfner, an office for his secretary Miss J. Lambert, a conference room/design file

room, a project workroom, a photographic darkroom, and an office for post doctoral student Dr. Chung Poon.

It is hoped that with this improvement of facilities for the centre, both the staff and students participating in CED courses will be better able to accomplish to goals of the design courses. Already the centre's workroom is alive with activity involving fatigue studies, fourth year undergraduate design projects and contract research.

H. Vogt